Assignment 02
(due on **10/23 19:00**)

PS2_1.R

1.1 [5 points] Read the .txt (or .tsv) file (signif.txt) with R and convert it to a tibble object named Sig_Eqs.

Answer:

```
Eqs_Data <- read.table(file = "signif.txt", sep = "\t",header = TRUE,fill=TRUE)
Sig_Eqs <- as_tibble(Eqs_Data)
```

1.2 [5 points] Compute the total number of deaths caused by earthquakes since 2150 B.C. in each country, and then print the top ten countries along with the total number of deaths.

Answer:

```
 group_by(COUNTRY) %>%
 summarize(Eqs_Deaths_Cty = sum(DEATHS,na.rm = T)) %>%
 arrange(desc(Eqs_Deaths_Cty)) %>%
```

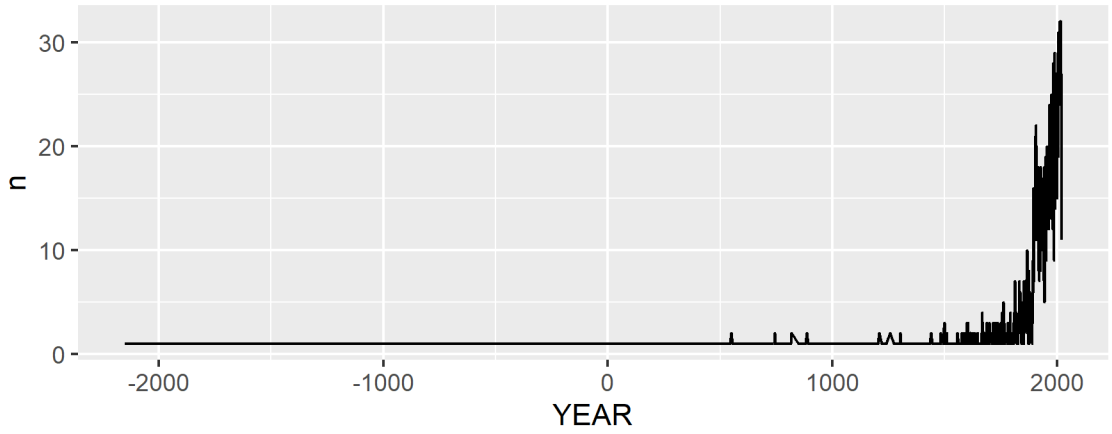
```
# A tibble: 10 x 2
   COUNTRY    Eqs_Deaths_Cty
   <chr>           <int>
 1 CHINA         2074881
 2 IRAN          1106676
 3 TURKEY        1074651
 4 SYRIA          439224
 5 ITALY          434865
 6 JAPAN          415137
 7 HAITI          321224
 8 AZERBAIJAN     317219
 9 ARMENIA        191890
10 PAKISTAN       148692
```

1.3 [10 points] Compute the total number of earthquakes with magnitude larger than 6.0 (use column EQ_PRIMARY as the magnitude) worldwide each year, and then plot the time series. Do you observe any trend? Explain why or why not?

Answer:

```
 filter(EQ_PRIMARY>6) %>%
 group_by(YEAR) %>%
 summarize(n = n()) %>%
 # Make the plot
 ggplot(aes(x=YEAR, y=n)) +
 geom_line()
```

```
ggsave("Eqs_Plot.png",Eqs_Plot,height = 6,width = 15,units = "cm")
```



It seems that the number of earthquakes with magnitude larger than 6.0 is getting larger. Maybe it's because we have more tools to record, or maybe just because the earth is developed to much.

1.4 [10 points] Write a function CountEq_LargestEq that returns both (1) the total number of earthquakes since 2150 B.C. in a given country AND (2) the date of the largest earthquake ever happened in this country. Apply CountEq_LargestEq to each country, report your results in a descending order.

```
CountEq_LargestEq <- function(Country_Name){
 results <- c(Sig_Eqs  %>%
   select(COUNTRY,YEAR,MONTH,DAY,EQ_PRIMARY) %>%
   filter(COUNTRY == Country_Name) %>%
      mutate(Eqs_Num_Cty=n(),
        Eqs_Max=max(EQ_PRIMARY,na.rm=T)) %>%
   #仅保留最大震级的一行数据
   filter(EQ_PRIMARY==Eqs_Max) %>%
   #mutate(Eq_Max_Date=as.Date(c(YEAR,MONTH,DAY)),"%Y%m%d") %>%
   mutate(Eq_Max_Date=paste(YEAR,MONTH,DAY,sep = "-"))%>%
    select(COUNTRY,Eqs_Num_Cty,Eqs_Max,Eq_Max_Date) %>%
    head(1))
 return(results)
}
```

COUNTRY	Eqs_Num_Cty	Eqs_Max	Eq_Max_Date
CHINA	606	8.5	1668-7-25
JAPAN	408	9.1	2011/3/11
INDONESIA	394	9.1	2004/12/26
IRAN	381	7.9	856-12-22
TURKEY	329	7.8	1912/8/9
ITALY	326	7.5	1915/1/13
USA	268	9.2	1964/3/28

GREECE	264	8	365-7-21
PHILIPPINES	220	8.7	1897-9-21
MEXICO	203	8.4	1899-1-24
CHILE	197	9.5	1960/5/22
PERU	184	8.8	1716-2-6
RUSSIA	150	9	1952/11/4
INDIA	98	8.6	1950/8/15
PAPUA NEW GUINEA	98	8.2	1919/5/6
TAIWAN	96	8	1920/6/5
COLOMBIA	79	8.2	1826-6-18
NEW ZEALAND	67	8	1826-NA-NA
VENEZUELA	66	8.4	1900/10/29
ECUADOR	64	8.6	1906/1/31
SOLOMON ISLANDS	61	8.1	1977/4/21
AFGHANISTAN	59	8.1	1909/7/7
ALBANIA	56	7.5	1893-6-14
ALGERIA	56	7.7	1980/10/10
VANUATU	54	8.1	1913/10/14
PAKISTAN	52	8	1945/11/27
CROATIA	48	7.2	1667-4-6
FRANCE	43	8	1817-3-11
USA TERRITORY	40	8.1	1902/9/22
NICARAGUA	39	7.9	1898-4-29
GUATEMALA	38	7.9	1942/8/6
EL SALVADOR	38	7.9	1915/9/7
COSTA RICA	34	7.7	1950/10/5
SYRIA	33	7.6	1202-5-20
MYANMAR (BURMA)	33	8	1912/5/23
SWITZERLAND	31	6.2	1601-9-8
SPAIN	27	7.5	881-5-26
AZORES (PORTUGAL)	26	7.6	1968/2/28
IRAQ	24	6.4	1864-12-2
TAJIKISTAN	24	7.4	1907/10/21
ISRAEL	23	7	-42
PORTUGAL	23	8.5	1755-11-1
PANAMA	23	8.3	1882-9-7
AUSTRALIA	23	8.2	1989/5/23
SLOVENIA	22	6.5	1511-3-26
TONGA	22	8.1	1919/4/30
SOUTH KOREA	20	6.5	1643-7-25
MOROCCO	20	6.4	2004/2/24
CANADA	20	8.1	1949/8/22
ARGENTINA	20	7.8	1944/1/15
NEW CALEDONIA	20	8	1875-3-28

JAMAICA	19	7.8	1899-6-14
FIJI	19	8.3	1919/1/1
BULGARIA	18	7.8	1904/4/4
ICELAND	18	7.5	1912/5/6
DOMINICAN REPUBLIC	18	7.9	1946/8/4
BANGLADESH	17	7.6	1918/7/8
KERMADEC ISLANDS (NEW ZEALAND)	17	8.1	1986/10/20
AZERBAIJAN	16	6.9	1667-11-NA
NEPAL	16	8.2	1505-6-6
HAITI	16	8.1	1842-5-7
EGYPT	15	7.2	1995/11/22
GEORGIA	15	7.5	1905/10/21
SERBIA	15	6	1922/3/24
ROMANIA	15	7.5	1977/3/4
LEBANON	14	7.3	551-7-9
KYRGYZSTAN	14	7.6	1946/11/2
UZBEKISTAN	14	7	1976/4/8
CUBA	14	7.7	2020/1/28
SOUTH AFRICA	14	7.9	1942/11/10
ARMENIA	13	6.8	1988/12/7
UK	13	6.2	1580-4-6
ETHIOPIA	13	6.8	1906/8/25
MACEDONIA	12	6.2	1979/5/24
HONDURAS	12	7.5	1856-8-4
TURKMENISTAN	11	8.2	1895-7-8
UKRAINE	10	6.8	1927/9/11
KAZAKHSTAN	10	8.3	1889-7-11
YEMEN	10	6	1982/12/13
BOSNIA-HERZEGOVINA	10	6.4	1969/10/27
MARTINIQUE	10	7.9	1906/12/3
TUNISIA	9	5.6	1957/2/20
GERMANY	9	5.3	1978/9/3
MONTENEGRO	9	6.9	1979/4/15
GUADELOUPE	9	8.3	1843-2-8
TRINIDAD AND TOBAGO	8	7.5	1888-1-10
SAMOA	8	8.3	1917/6/26
AUSTRIA	7	6.6	1590-9-15
CYPRUS	6	6.5	1953/9/10
NORTH KOREA	6	6.7	1518-7-2
CONGO	6	7	1992/9/11
BOLIVIA	6	8.2	1994/6/9
MONGOLIA	6	8.4	1905/7/9
BRAZIL	6	4.8	1986/11/30
TANZANIA	6	6.5	2000/10/2

POLAND	6	4.8	2004/9/21
JORDAN	5	7.3	#NAME?
GHANA	5	6.5	1862-7-10
HUNGARY	5	6.8	1834-10-15
VIETNAM	5	6.8	1935/11/1
ATLANTIC OCEAN	5	8.3	1941/11/25
SOUTH GEORGIA AND THE SOUTH SANDWICH ISLANDS	5	7.8	1929/6/27
BHUTAN	5	6.1	2009/9/21
THAILAND	4	6.1	2014/5/5
SUDAN	4	7.1	1990/5/20
MICRONESIA, FED. STATES OF	4	7.7	1911/8/16
ANTARCTICA	4	8.1	1998/3/25
MALAWI	4	6.1	1989/3/10
RWANDA	4	5.8	2015/8/7
SLOVAKIA	3	2.2	2004/1/10
ANTIGUA AND BARBUDA	3	8	1690-4-16
INDIAN OCEAN	3	8.1	1928/3/9
UGANDA	3	7	1966/3/20
MALAYSIA	3	6.2	1976/7/26
NETHERLANDS	3	5.2	1992/4/13
SAUDI ARABIA	3	5.7	2009/5/19
MOZAMBIQUE	3	7	2006/2/22
TOGO	2	5.6	1788-NA-NA
UK TERRITORY	2	7.6	1983/11/30
FRENCH POLYNESIA	2	6.5	1848-7-12
COTE D'IVOIRE	2	5.7	1879-2-11
SOLOMON SEA	2	7.3	1895-3-6
CAMEROON	2	6.2	1945/9/12
ZAMBIA	2	7.3	1910/12/13
KENYA	2	4.6	1968/3/20
PACIFIC OCEAN	2	7.5	1932/11/2
LAOS	2	6.3	2007/5/16
SIERRA LEONE	1	5.2	1795-5-20
NORWAY	1	5.8	1819-8-31
ERITREA	1	6.2	1884-7-20
KIRIBATI	1	7.6	1905/6/30
PALAU	1	7.6	1914/10/23
CENTRAL AFRICAN REPUBLIC	1	4.8	1921/9/16
LIBYA	1	5.4	1963/2/21
GABON	1	6.2	1974/9/23
BELGIUM	1	5	1983/11/8
GUINEA	1	6.2	1983/12/22
DJIBOUTI	1	6.3	1989/8/20
BERING SEA	1	6.7	1991/2/21

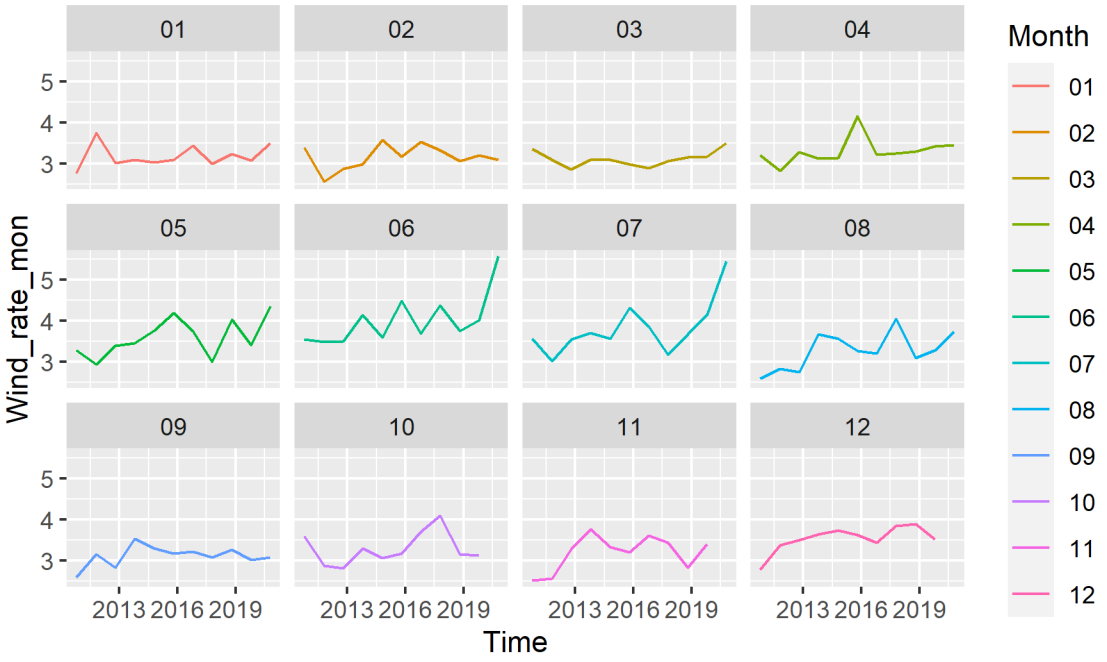
WALLIS AND FUTUNA (FRENCH TERRITORY)	1	6.4	1993/3/12
BURUNDI	1	4.7	2004/2/24
CZECH REPUBLIC	1	4.1	2008/11/22
MADAGASCAR	1	5.5	2017/1/11
COMOROS	1	5.8	2018/5/15

PS2_2.R

In this problem set, we will examine how wind speed changes in Shenzhen during the past 10 years. Recall the 2281305.csv you used for Exercise #3 in Section 03. Read page 8-9 of the comprehensive user guide for the detailed format of the wind data. Explain how you filter the data in your report. Use functions from tidyr, dplyr, and ggplot2 packages to:

[10 points] Plot monthly averaged wind speed as a function of the observation time. Is there a trend in monthly averaged wind speed within the past 10 years?

Answer:It seems in most months ,the monthly averaged wind speed is getting larger.



PS2_3.R

Revisit the data set you used in Problem 7 of the Assignment 01. Now use functions from tidyr, dplyr, and ggplot2 packages to:

[10 points] Reproduce the same time series you made previously in Assignment 01.

Answer:I improved my results, and the plot is as follow,